35. (Amended) The method in accordance with claim 33, wherein said providing and assembling steps result in the ends of the fiber optic fibers being flush with the face of the connector module and the ends of the waveguides being flush with the face of the substrate module.

A11

40. (Amended) The method in accordance with claim 33, wherein said substrate module assembling procedure includes:

A13

forming a wafer having a plurality of aligned respective channels;

forming another wafer having a plurality of aligned respective waveguides; and

assembling the two wafers together such that the plurality of aligned respective channels accommodate the plurality of aligned respective waveguides.

REMARKS

Formal drawings are submitted in response to the requirement for corrected drawings made in the Office Action.

Claims 12 and 26 are objected to under 37 C.F.R. 1.75(c). Each of claims 12 and 26 is amended in a manner consistent with revisions to their respective independent claims and in a manner which are respectfully believed to obviate this objection.

Claims 1-11, 13-25 and 27-41 are rejected under 35 U.S.C. Section 103(a) from Bunin et al. U.S. Patent No. 5,907,651 in view of Yanagawa et al. U.S. Patent No. 5,297,228. Applicant observes that Bunin is directed to a fixture for making connector ferrules by means of a fixture for this purpose. Yanagawa teaches a method of connecting an optical fiber chip to end chips or jigs cut from the same structure as the chip.

Bunin has no teaching of what to use with the connector ferrule made on the fixture of that patent, other than making general reference to fiber optic connector assemblies. In a sense, the connector ferrule is taught as being a beneficial approach for terminating a fiber optic ribbon cable by adding thereto the connector ferrule. There is nothing in Bunin to suggest combining this type of connector ferrule with one of the components of the Yanagawa assembly.

The three components of the Yanagawa assembly are clearly taught by Yanagawa to be used together. Each end chip B1 and B3 are said to align properly with the chip B2 principally because the two end chips and the central chip are made from the same components and at the same time. They are said to align properly because they are cut from the same chip, thereby greatly facilitating their renewed realignment. Furthermore, even though the fiber guide grooves 7 are formed after the end chips are cut from the central chip, this forming of the grooves 7 uses the marker grooves 2 of the pre-cut assembly as reference marks. See, for example, lines 40-41 of column 4. Yanagawa has no teaching or suggestion that its central chip B2 could be used with any other component (such as in Bunin) and achieve proper alignment, which is critical in fiber optic systems.

Both of the independent apparatus claims, namely claim 1 and claim 21, are presently amended in order to more particularly define the substrate module. This is the component which the Office Action suggests is rendered obvious by the central chip B2 of Yanagawa. Claims 1 and 21 specify that the substrate module has waveguides with pins terminating at a first face or at a second face, thereby defining the input end and the output end of this substrate module. Support therefor is found in the drawings, especially Fig. 1, reference numerals 24 and 25, and also by Fig. 3 and Fig. 6, as well as in the second paragraph on page 8.

Dependent claims 12, 15, 22 and 26 also are amended so as to be consistent with this revision of the independent claims.

Independent method claim 33 is amended to specify that the substrate module and the connector module are provided by assembly procedures which are separate from each other. This is clearly evident from the drawings, especially Fig. 1, as well as from various passages in the description which provide details of the assembly of the substrate module according to the invention totally independent of the connector module(s). Further disclosure is found in Fig. 4, Fig. 5, Fig. 6, Fig. 7 and Fig. 8. Dependent method claims 35 and 40 are revised so as to be consistent with this amendment of claim 33.

A consideration of Yanagawa from the point of view of these claim amendments makes it clear that the teachings of Yanagawa do not allow for its central chip B2 to have end

faces which are anything other than identical or to have a central chip other the one assembled by the same assembly procedure as the end chips B1, B2 of Yanagawa.

More particularly, the waveguide body A shown in Fig. 2 has the optical waveguides 4 formed in therein throughout its length, as well as the marker grooves 2. Fig. 3 shows this waveguide body into which pin guide grooves 6 have been cut, again throughout the length, while using the grooves 2 as a guide. Fig. 4 shows the following step wherein the end chips or jigs are simply cut from the waveguide body in order to form the chips B1, B3 and the central chip B2. Thereafter, as shown in Fig. 5, the V-grooves 7 are cut into the end chips B1 and B3, once again using the marker grooves 2 as reference marks. These procedures are detailed in the description of Yanagawa, especially from line 29 through line 60 of column 4.

Focusing upon the manner in which the end chips B1, B3 are made (as summarized above), the central chip B2 must have identical faces formed when end chip B1 was cut from one end and end chip B3 was cut from the other end. It is particularly evident that the thus-formed ends of the waveguides 4 are the same size and shape and have the same relative position on both faces. The same is true for the waveguide grooves 6. This relative spacing, shape and size are dictated by the manufacturing process of Yanagawa. Yanagawa makes no suggestion of any other way of achieving the alignment of waveguides and pin guide grooves as between a central chip B2 and the end chips B1 and B3.

Accordingly, even if it would have been obvious to combine the teachings of Yanagawa with the teachings of Bunin, applicant's claimed invention could not have been arrived at by one of ordinary skill. The opposing faces of the central chip B2 of Yanagawa would not form an input end and an output end which are different from each other. Therefore, reconsideration and allowance of all of the apparatus claims, namely claims 1 through 32, are believed to be in order.

Regarding method claims 33 and 41, it is clear from the preceding and from all of the teachings of the Yanagawa patent that the central chip B2 is assembled at the same time and with the same components as are end chips B1 and B3, which the Section 103 rejection posits can be substituted obviously by the connector ferrules of Bunin. Bunin's teachings are at odds with having its connector be made at the same time as the central chip. The fixture

which is the subject of this patent cannot accommodate a simultaneously and identically constructed central chip.

Yanagawa achieves its alignment features by having components to be aligned made at the same time and by the same assembly. Yanagawa teaches alignment by severing and repositioning. This is a totally different approach from that claimed by applicant. By the method of applicant, the connector module and the substrate module undergo separate assembly procedures, requiring a totally different approach in order to achieve superior alignment.

Reconsideration and allowance of method claims 33 through 41 are respectfully believed to be in order.

With reference to the Section 103 rejection of claims 12 and 26 from Bunin and Yanagawa in view of what the Office characterizes as applicant's admission of prior art (AAPA), the following is observed. First of all, each of claims 12 and 26 are dependent upon independent claims which are respectfully believed to be allowable for the reasons noted above. As far as the AAPA is concerned, the passage in the paragraph common to pages 3 and 4 of the applicant's description recites the fact that DWDM were made with an active approach (as opposed to the passive approach of the present invention). However, this still leaves unsupported any motivation to use a passive system as presently claimed, much less teaching a means for a passive system suitable for this DWDM context. Reconsideration and withdrawal of this rejection are believed to be in order.

Applicant has made an earnest endeavor to place this application into condition for allowance, and favorable consideration is respectfully requested.

Respectfully submitted,

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Version of Amended Specification and Claims Showing the Changes Made

In the Description:

Please replace the paragraph common to pages 3 (lines 23-27) and 4 (lines 1-4) with the following revised paragraph:

--(Amended) One of the most important functions in connection with DWDM products is attaching fibers for coupling [right] light in and out of the device with minimum loss. In the past, this has required input and output fibers being first attached to separate platforms at appropriate distances using adhesive glue or curable epoxy. In this prior art approach, these platforms then are brought in close proximity with a device such as a multiplexing and/or demultiplexing device and actively aligned to the appropriate waveguides. An example of a prior art approach is found in Yamane et al. U.S. Patent No. 5,557,695, in which so-called integral waveguides are provided and the optical fibers are laid in guide grooves as part of the connection procedure.--

Please replace the third paragraph on page 5 (lines 18-20) with the following revised paragraph:

--(Amended) Another object of this invention is to provide an [approved] improved fiber optic connection component which is readily installed in the field and does not require laboratory conditions or expensive equipment.--

Please replace the third paragraph (lines 7-8) on page 7 with the following revised paragraph:

--(Amended) FIG. 2 is an enlarged [prospective] perspective view of one of the connector receptacles illustrated in FIG. 1;--

Please replace the first paragraph (lines 1-7) on page 8 with the following revised paragraph:

--(Amended) In the embodiment which is illustrated in FIG. 1, a connector receptacle or connector ferrule 21 is in general position for aligning assembly with one attachment location of a substrate 22, shown in [exploited] <u>exploded</u> form in this view. Another connector receptacle 23 likewise is shown in a general mating alignment with a different attachment location of the substrate 22. Each attachment location provides a connection location at which passive alignment takes place, as explained more fully elsewhere herein.--

<u>In the Claims</u>:

--1. (Amended) A passive alignment fiber optic connection system, comprising:

a connector module having a plurality of fiber optic fibers having ends terminating at a face of said connector module;

a substrate module having a plurality of waveguides having ends terminating at a <u>first face or at a second</u> face of said substrate module <u>to define an input end and an output end which are different from each other</u>;

at least two pins projecting from one of said modules at pin locations;

at least two pin passages within another of said modules at pin locations and through said face thereof, respective said pin passages being sized, shaped and positioned to receive respective said projecting pins; and

said ends of said fiber optic fibers are spaced from one another and from said pin locations of the connector module in accordance with a predetermined alignment pattern, and said ends of said waveguides are spaced from one another and from said pin locations of the substrate module in accordance with said predetermined alignment pattern, whereby each of said respective waveguides optically align with each of said respective fibers when said modules are attached together.--

--12. (Amended) The fiber optic connection system in accordance with claim 1, wherein said [system is for dense wavelength division multiplexing products] <u>input end of the</u>

substrate module has a different number of waveguide ends than does said output end of the substrate module.--

--15. (Amended) The fiber optic connection system in accordance with claim 1, wherein said system has more than one said connector, [said substrate has an input component and an output component,] one said connector is provided for attachment with said input end [component], and another said connector is provided for attachment with said output end [component] of the substrate module.--

--21. (Amended) A passive alignment fiber optic substrate module, comprising:

a substrate body having a first face and a second face;

a plurality of waveguides which are within said substrate body and which have first ends terminating at said first face and second ends terminating at said second face of the substrate module to define an input end and an output end which are different from each other;

a pin location at said first face, and a pin location at said second face [at least two pin locations]; and

said first ends of said waveguides are spaced from one another and from one said pin location[s] and said second ends are spaced from one another and from another said pin location of the substrate module in accordance with respective [a] predetermined alignment patterns which [is] are adapted to coincide with fiber optic fibers and pin locations of another component.--

--26. (Amended) The fiber optic substrate module in accordance with claim 21, wherein said [system is for dense wavelength division multiplexing products] input end of the substrate module has a different number of waveguide ends than does said output end of the substrate module.--

--33. (Amended) A method for passive optical alignment of a fiber optic connection system, comprising the steps of:

providing a connector module having a plurality of fiber optic fibers having ends terminating at a face of the connector module and having at least two pin locations;

spacing said ends of the fiber optic fibers and said pin locations in accordance with a predetermined alignment pattern;

[providing] <u>assembling, by an assembly procedure separate from said providing step,</u> a substrate module having a plurality of waveguides having ends terminating at a face of the substrate module and having at least two pin locations;

spacing said ends of the waveguides from one another and from said pin locations of the substrate module in accordance with said predetermined alignment pattern; and

attaching the connector module and substrate module together in order to thereby automatically optically align each of the respective waveguides with each of the respective fibers when the modules are attached together.--

--35. (Amended) The method in accordance with claim 33, wherein said providing <u>and assembling</u> steps result in the ends of the fiber optic fibers being flush with the face of the connector module and the ends of the waveguides being flush with the face of the substrate module.--

--40. (Amended) The method in accordance with claim 33, wherein said [providing step for the] substrate module [includes an] assembling procedure [including] <u>includes</u>:

forming a wafer having a plurality of aligned respective channels;

forming another wafer having a plurality of aligned respective waveguides; and

assembling the two wafers together such that the plurality of aligned respective channels accommodate the plurality of aligned respective waveguides.--